

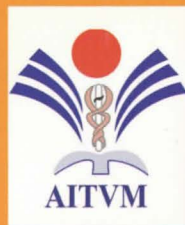
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THE ROLE OF WILD HOSTS (WILD PIGS AND TICKS) IN THE EPIDEMIOLOGY OF AFRICAN SWINE FEVER IN WEST AFRICA AND MADAGASCAR

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ABSTRACT

African swine fever (ASF) adversely affects pig production in Sub-Saharan Africa. In southern and eastern Africa, the virus is maintained in populations of wild pigs (*Phacochoerus africanus*) and soft ticks from the Genus *Ornithodoros*. The bushpig (*Potamochoerus larvatus*) has also been showed to be asymptotically infected by the virus. In other parts of the African continent such as West Africa or Madagascar, the role of wild suids has not been demonstrated. The objectives of this study were to investigate the existence of a sylvatic cycle and its potential impact on the epidemiology of ASF in Senegal and Madagascar. . Samples from Malagasy bushpigs and Senegalese warthogs have been collected from areas of interface between domestic and wild pigs where ASF had been reported and analyzed for anti-ASF antibodies (ELISA) and viral DNA (PCR). Ticks were collected in pig farms and near wild suids resting areas, and their infection status with ASFV was determined using PCR. In addition, sera from wild suids and domestic pigs were tested for anti-tick antibodies (ELISA). The preliminary results obtained so far suggest that the epidemiologic cycle of ASF in Senegal and Madagascar does not involve the warthog-tick-domestic pig transmission described in East and South Africa.

INTRODUCTION

African swine fever (ASF) adversely affects pig production in the African continent and Madagascar. In southern and eastern Africa, the virus is maintained in populations of warthogs (*Phacochoerus africanus*) and soft

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ticks from the Genus *Ornithodoros* (Plowright *et al.*, 1994). The bushpig (*Potamochoerus larvatus*) has also been showed to be asymptotically infected by the virus (Anderson *et al.*, 1988). In Senegal and Madagascar, the role of wild pigs in the epidemiology of ASF has never been demonstrated. *Ornithodoros moubata* is present in Madagascar but not in Senegal. Although *Ornithodoros moubata* is not present in the Senegal, and ecologically and taxonomically similar soft tick, *O. sonrai*, is present in the country in human settlements and could act as a reservoir of the virus. The objective of this study was to investigate the existence of a sylvatic cycle for ASF in these two countries.

MATERIALS AND METHODS

In the Sine Saloum region (Senegal), 101 pig farms and 48 warthog burrows were inspected for soft ticks in four different areas. Sampled ticks were analysed by PCR amplification of VP72 gene B646L (Basto *et al.*, 2006). In addition, 162 warthogs samples (serum, filter paper and tissue samples) were collected in hunting camps and nature reserves from six different areas of Senegal and Mauritania over three years and analysed by a Blocking ELISA test (Ingenasa, Madrid, Spain).

In Madagascar, 27 sera samples and 35 blood and tissue samples were obtained from bushpigs in the region of Marovoay, where bushpigs (*P. larvatus*) are abundant and ASF had recently been reported by farmers. Samples were analyzed by different serological methods (Blocking ELISA, p30Recombinant ELISA and Western Blott) and PCR. In addition, the 27 sera from bushpigs and 273 sera of pigs collected in three different areas of Madagascar were tested for antibodies against *O. moubata* salival glands using an ELISA test (Canals *et al.*, 1990).

RESULTS

In Senegal, among the 101 inspected pig farms, *O. sonrai* was found in 44 farms. In 95% of cases, soft ticks were found inside rodent burrows situated close (25% at less than 10 m) to pig pens. Preliminary analysis of tick samples allowed the detection of ASFV DNA in three of them by PCR. A large sample of ticks still has to be analysed to assess the prevalence of infection. In natural areas, no tick was found within warthog burrows (n=48). However, some ticks were found in rodent

burrows close to warthog resting sites. Among the 162 sera from warthogs, none was found positive to the Blocking ELISA.

In Madagascar, all samples from bushpigs were found negative for antibodies or direct detection of ASFV. The 27 bushpig sera were found negative for *O. moubata* salival gland antibodies. Out of the 273 pig sera tested against *O. moubata* salival gland antibodies, 51% were found positive, among which 7% were highly positive. The positive sera were collected in three different areas of Madagascar.

DISCUSSION

Although these results are only preliminary, they suggest that the epidemiologic cycle of ASF in Senegal and Madagascar does not involve the warthog-tick-domestic pig transmission otherwise described in East and South Africa. No virus has been detected in wild pigs in any of these two countries. Nevertheless, the ELISA test used has not been validated in wild suids and the results were not evaluated using a positive reference serum.

Very few reports are found regarding the involvement of wild pigs in the epidemiology of ASF in West Africa (Taylor *et al.*, 1977). Although our results suggest that this virus is not circulating in warthogs in Senegal, a red river hog (*Potamochoerus porcus*) has recently been found infected with ASFV in Nigeria (Luther *et al.*, 2007), which suggests that ASFV can circulate in West African populations of wild pigs. Further analysis of the samples collected in this study should be undertaken with more specific serological tests in order to definitely exclude the infection of warthogs with ASFV in Senegal. However, direct transmission from wild to domestic pigs seems unlikely since warthogs are scarce in the studied region due to overhunting.

The role of *O. sonrai* in the epidemiology of ASF in Senegal has not been confirmed. Despite the possibility of occasional contacts between *O. sonrai* and domestic pigs, this soft tick is not present in warthog burrows in Senegal and contacts between wild pigs and soft ticks seem very occasional. Experimental infections are necessary to confirm that *O. sonrai* can act as a vector of the disease. Therefore, our results suggest that the role of wild hosts in the epidemiology of the disease in Senegal, if not excluded, is probably negligible compared to the domestic pig cycle.

In Madagascar, ASFV has not been detected in bushpigs so far. However, our sample was small and probably insufficient to detect the low levels of infection observed in bushpigs in the African continent. The detection of antibodies against *O. moubata* in a large proportion of the pig sera tested by ELISA suggests that contacts between pigs and soft ticks might be more frequent than expected. Further studies are needed to confirm the presence of soft ticks in farms where pig sera contained anti-tick antibodies and the presence of ASFV in those ticks. The specificity of the ELISA test against antibodies from *O. moubata* also need to be evaluated. However, contacts between soft ticks and bushpigs are not likely to occur since bushpigs do not live in burrows. Therefore, the role of *O. moubata* in the maintenance of the disease is probably circumscribed to domestic pigs.

Our study suggests that the epidemiological cycles of ASFV in West Africa and Madagascar are different from those described in other regions of Africa. If it exists, the sylvatic cycle is likely to be limited to a tick-domestic pig cycle. Further studies will be undertaken in order to confirm or exclude the hypothesis of a sylvatic cycle involving wild hosts in Senegal and Madagascar. Its importance in the epidemiology of the disease should also be investigated using analytical tools such as risk mapping, risk assessment or transmission models.

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